I. QUALITY ASSURANCE

1. ASTM A125 AND A490 BOLTS, NUTS AND WASHERS SHALL BE TESTED BY CONTRACTOR. SUCH TESTING SHALL BE IN ADDITION TO TESTING REQUIRED OF MANUFACTURER IN PART III.K.10 OF THIS SPECIFICATION. SAMPLING, INSPECTIONS AND TESTING SHALL BE BY THE SHIPPING LOT METHOD, TAKEN FROM FASTENER COMPONENTS ACTUALLY DELIVERED TO THE CONSTRUCTION SITE.

   a) CHEMICAL ANALYSIS (A751) IS NOT REQUIRED. PROOF LOAD TESTING (F606) SHALL BE ACCOMPLISHED FOR EACH LOT OF EACH GRADE, SIZE AND TYPE OF EACH FASTENER COMPONENT.

   b) PROOF LOAD TESTING SHALL BE CONDUCTED ON FULL-SIZE BOLTS AND COMPONENTS, NOT ON MACHINED TEST SPECIMENS.

   c) PROOF LOAD TESTING SHALL BE ACCOMPLISHED USING METHOD 1 (LENGTH MEASUREMENT) OF METHOD F606.

   d) TESTING SHALL INCLUDE BOTH HARDNESS AND TENSILE STRENGTH.

   e) ADDITIONALLY, PROVIDE ALL OTHER TESTING STIPULATED AS MANDATORY UNDER THE ASTM SPECIFICATION.

2. BOLT INSTALLATION SHALL BE IN ACCORD WITH THE PROVISIONS OF THIS SPECIFICATION AND IN NO CASE LESS THAN THE BEST INDUSTRY PRACTICE.

   a) CONTRACTOR SHALL PROVIDE AND SHALL MAINTAIN IN GOOD CONDITION A SKIDMORE WELHELM BOLT TENSION CALIBRATOR (OR OTHER DEVICE ACCEPTED BY THE ENGINEER) AT EACH LOCATION WHERE HIGH-STRENGTH BOLTS ARE BEING TENSIONED. CONTRACTOR SHALL TEST REGULARLY:

      i) BOLT, NUT, WASHER AND LUBRICANT ASSEMBLIES FOR THE ACHIEVEMENT OF PROPER TENSION; AND

      ii) THE COMPETENCE AND UNDERSTANDING OF BOLTING CREWS FOR EACH METHOD OF TENSIONING BOLTS FOR EACH SIZE AND GRADE EMPLOYED IN THE WORK.

J. JOB CONDITIONS

1. CONSTRUCTION SEQUENCE: DESCRIPTIONS OF LIMITATIONS ON CONSTRUCTION SEQUENCE ARE INTENDED TO ASSIST CONTRACTOR IN COORDINATING THE WORK OF THE CONTRACT. DESCRIPTIONS DO NOT DESCRIBE FULLY THE LIMITATIONS GIVEN, DO NOT DESCRIBE ALL LIMITATIONS, NOR DO THEY PRECLUDE CONSTRUCTION SEQUENCES NOT CONTEMPLATED HEREIN. WHETHER OR NOT CONTRACTOR FOLLOWS THE LIMITATIONS OF CONSTRUCTION SEQUENCE DESCRIBED HEREIN, AND UNTIL SUCH TIME AS THE STRUCTURAL WORK IS COMPLETED, CONTRACTOR REMAINS FULLY RESPONSIBLE FOR BOTH THE STABILITY AND THE SAFETY OF THE WORK; ADHERENCE TO THE LIMITATIONS DESCRIBED HEREIN DOES NOT RELIEVE CONTRACTOR FROM THAT RESPONSIBILITY.

K. MATERIALS

1. STRUCTURAL STEEL FURNISHED FOR EACH LOCATION SHALL PROVIDE THE MINIMUM YIELD POINT GIVEN IN THE CONTRACT DRAWINGS, SHALL CONFORM TO THE APPLICABLE ASTM STEEL SPECIFICATION, SHALL MEET THE REQUIREMENTS OF *BUILDING CODE*, SHALL BE SUITABLE FOR USE IN WELDED STRUCTURES AND SHALL MEET THE REQUIREMENTS BOTH OF THE CONTRACT DRAWINGS AND OF THIS SPECIFICATION. ALL MATERIAL SHALL BE NEW AND OF BEST COMMERCIAL QUALITY. STEELS PRODUCED TO MODIFIED ASTM SPECIFICATIONS SHALL NOT BE USED WITHOUT WRITTEN ACCEPTANCE. EXCEPT WHERE SPECIFIC PRODUCTS ARE GIVEN IN THE CONTRACT DRAWINGS OR IN THIS SPECIFICATION, STRUCTURAL STEEL USED IN THE WORK MAY BE CHOSEN BY CONTRACTOR FROM THE APPLICABLE SPECIFICATIONS LISTED IN *AISC SPECIFICATION* AND ACCEPTED BY BOTH *BUILDING CODE* AND BY THE ENGINEER.

2. CONTRACTOR, IN ORDERING MATERIALS FROM MANUFACTURERS AND VENDORS, SHALL ENSURE THAT THE MANUFACTURER OR VENDOR UNDERSTANDS FULLY THE INTENDED USE OF THE AS-FABRICATED AND AS-ERECTED WORK. PURCHASE ORDERS SHALL IDENTIFY THE END USE OF PURCHASED MATERIALS. EXAMPLES OF END USE INCLUDE:

   a) TRUSS CORDS AND WEB MEMBERS
   b) BUILT-UP MEMBER FLANGES AND WEBS
   c) COLUMNS
   d) TENSION MEMBERS
   e) ELEMENTS OF RIGID FRAMES
   f) ALL ELEMENTS IDENTIFIED SPECIFICALLY IN DRAWINGS
   g) ALL SPECIAL AND SENSITIVE AREAS OF THE WORK

   PARTICULAR CARE SHALL BE TAKEN TO IDENTIFY MATERIALS:

   h) STRESSED IN TENSION TRANSVERSE TO THE GRAIN (RIGID FRAMES, TRUSSES, ETC.)

   IT IS THE INTENT OF THESE PROVISIONS TO ASSIST PRODUCER IN THE SELECTION OF MATERIALS BEST SUITED FOR THE INTENDED PURPOSE.

3. UNLESS NOTED SPECIFICALLY AS NOT CARRYING TENSILE LOADS OR DETAILED AS BOLTED, ALL STEELS AND PRODUCTS SELECTED FOR USE IN THE WORK SHALL BE SUITABLE FOR USE AS TENSION MEMBERS, CONNECTED BY WELDING.

4. SHOP AND FIELD-APPLIED PAINT SHALL BE PROVIDED WHERE DESIGNATED IN THE CONTRACT DRAWINGS, SPECIFIED HEREIN, AND WHERE REQUIRED BY *BUILDING CODE*. PAINT MATERIALS SHALL BE FULLY COMPATIBLE WITH FIREPROOFING AND OTHER MATERIALS IN CONTACT WITH THE PAINT AND SHALL BE SELECTED FROM THE FOLLOWING:

   a) SHOP PRIMER AND FIELD TOUCH-UP:

      i) TNEMEC 10-99, TNEMEC CO., INC.
      ii) CARBOLINE GP-818, CARBOLINE INC.
      iii) DUPONT 681-FD, RED OXIDE, DUPONT DO.
      iv) OTHER WHERE ACCEPTED

   b) ZINC-RICH:

      i) TNEMEC 90-96, TNEMEC CO. INC.
      ii) CARBOLINE CARBOZINC 11 RS, CARBOLINE INC.
      iii) GANICIN 347 WB, DUPONT DO.
      iv) OTHER CLASS A OR BETTER COATING, AS DEFINED BY AISC, WHERE ACCEPTED

   c) ALUMINUM PASTE VARNISH SHALL CONSIST OF 2 LBS OF ALUMINUM PASTE PIGMENT (ASTM D 962-66, TYPE 2, CLASS B) PER GALLON (240 G PER LITER) OF ALKYD VARNISH (FEDERAL SPECIFICATION TT-V-8, TYPE II).

5. GALVANIZED STEEL: WHERE REQUIRED TO BE GALVANIZED, MEMBERS SHALL BE HOT-DIPPED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 OR TO ASTM A153 (TABLE 1), AS APPLICABLE. GALVANIZING SHALL EQUAL OR EXCEED 2 OZ. PER SQUARE FOOT (600 G/M^2) OF SURFACE.

6. GALVANIZING TOUCH-UP: PROVIDE ORGANIC, ZINC-RICH PAINT:

   a) TNEMEC 90-97
   b) CARBOLINE 858, CARBOLINE INC.
   c) PPG INDUSTRIES NO. 91-670, PPG INDUSTRIES
   d) OTHER WHERE ACCEPTED

7. WELDING MATERIALS SHALL BE AS REQUIRED BY AWS FOR CONDITIONS OF INTENDED USE AND FOR THE METAL BEING WELDED. WELDING MATERIALS SHALL CONFORM TO AWS A5.1, A5.5, A5.17, A5.18, A5.20 AND A5.23 AND SHALL BE E7018, E7028, E8018-C3, F7A2-EXXX, E70T-1, E70T-6 OR E71T-8, EXCEPT WHERE OTHER WELDING MATERIAL OR MATERIAL COMBINATIONS AND RELATED WELDING PROCESSES ARE ACCEPTED. WELDING ELECTRODES WHICH HAVE BEEN DAMPENED OR WHICH HAD BEEN CONTAMINATED BY GREASE OR OTHER SUBSTANCES DELETERIOUS TO WELDING SHALL NOT BE USED IN THE WORK.

8. SHIELDING GAS SHALL BE OF A WELDING GRADE HAVING A DEW POINT OF -40°F (-40°C) OR LOWER.

9. STUD SHEAR CONNECTORS AND CONCRETE ANCHOR STUDS: MATERIAL AND EQUIPMENT FOR WELDED STUDS, STUD SHEAR CONNECTORS AND CONCRETE ANCHOR STUDS SHALL CONFORM TO AWS D1.1.

10. HIGH TENSILE BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE APPLICABLE ASTM SPECIFICATION AS FOLLOWS:

    BOLTS: ASTM A325, TYPE 1 OR ASTM A490, TYPE 1 — NUTS: ASTM A563, DH OR ASTM A194, 2H — WASHERS: ASTM F436

    ALL FASTENER COMPONENTS SHALL BEAR THE MANUFACTURERS MARK; NUTS SHALL BEAR THE DH OR 2H SYMBOL AS APPLICABLE. ALL BOLTS, NUTS AND WASHERS SHALL BE COLD FORGED; BOLTS AND NUTS SHALL HAVE ROLLED THREADS. NEITHER HOT FORGED BOLTS OR NUTS NOR CUT THREADS MAY BE USED IN THE WORK.

    a) IN ADDITION TO THE MANDATORY TESTING PROVIDED IN THE ASTM SPECIFICATION, PROOF LOAD TESTING (F606), CHEMICAL ANALYSIS (A751) AND CERTIFICATION SHALL BE REQUIRED OF MANUFACTURER; FOR GALVANIZED BOLTS, NUTS AND WASHERS, MANUFACTURER'S CERTIFICATION SHALL INCLUDE THE RESULTS OF THE ROTATIONAL-CAPACITY TESTS AS WELL AS THE RESULTS OF THE ZINC THICKNESS MEASUREMENTS. EXCEPT FOR THE ROTATIONAL-CAPACITY TESTS OF GALVANIZED BOLT, NUT AND WASHER ASSEMBLIES, WHICH SHALL BE PERFORMED IN ACCORD WITH THE SHIPPING LOT METHOD, ALL TESTING AND ANALYSIS SHALL BE CONDUCTED IN ACCORD WITH THE PRODUCTION LOT METHOD. TESTING SHALL BE COMPLETED FOR EACH GRADE OF EACH TYPE OF EACH SIZE OF FASTENER. FASTENER COMPONENTS NOT IN FULL CONFORMANCE TO THE APPROPRIATE ASTM SPECIFICATION SHALL NOT BE SHIPPED TO THE WORK.

       i) PROOF LOAD TESTING SHALL BE CONDUCTED ON FULL-SIZE BOLTS AND COMPONENTS NOT ON MACHINED TEST SPECIMENS.

       ii) PROOF LOAD TESTING SHALL BE ACCOMPLISHED USING METHOD 1 (LENGTH MEASUREMENT) OF METHOD F606.

       iii) TESTING SHALL INCLUDE BOTH HARDNESS AND TENSILE STRENGTH.

    b) BOLTS, NUTS AND WASHERS SHALL BE MANUFACTURED BY A MEMBER OF THE INDUSTRIAL FASTENERS INSTITUTE AND SHALL BE PURCHASED DIRECTLY FROM THE MANUFACTURER AND NOT FROM A SECONDARY SOURCE.

    c) ACCEPTED MANUFACTURERS ARE:

       1) LAKE ERIE SCREW CORP.
       2) NUCOR FASTENER
       3) OTHER WHERE ACCEPTED.

    d) DOUBLE NUTS SHALL BE USED FOR ALL FASTENERS DESIGNATED AS FINGER TIGHT.

    e) GALVANIZED BOLTS, NUTS, WASHERS, DTI'S AND INSERTS, AS APPLICABLE, CONFORMING TO ASTM B695, CLASS 50 SHALL BE USED AT ALL SURFACES CONTAINING GALVANIZED MATERIALS AND AT ALL SURFACES EXPOSED TO AMBIENT TEMPERATURES. GALVANIZING SHALL BE UNDERTAKEN ONLY ON A125, TYPE 1 BOLTS AND ON ASTM A563 ON NUTS.

    f) BEVELED WASHERS SHALL BE SQUARE, SMOOTH, AND SHALL BE SLOPED TO PROVIDE CONTACT SURFACES IN FULL BEARING. PROVIDE FOR ALL SLOPES OF 1:20 AND LARGER.

    g) THE DIAMETER OF HOLES IN SPECIAL, BEVELED AND SQUARE WASHERS SHALL NOT EXCEED 1/16" (1600 MM) MORE THAN THE NOMINAL BOLT DIAMETER.

    h) THREAD LUBRICATION SHALL BE JOHNSONS 140 STIK WAX (JOHNSONS 139 FOR GALVANIZED FASTENERS) OR OTHER ACCEPTED LUBRICANT.

11. BOLT TENSION INDICATING DEVICES SHALL BE DIRECT-TENSION INDICATING WASHERS (DTI) OR TENSION CONTROL FASTENERS (TCF).

    a) DIRECT-TENSION INDICATING WASHERS SHALL BE OF DOMESTIC MANUFACTURE, CONTAINING ONLY DOMESTICALLY PRODUCED RAW MATERIALS, CONFORMING TO ASTM F959. ACCEPTED MANUFACTURERS ARE J & M TURNER, INC., BETH-FAST, OR OTHER ACCEPTED BY ENGINEER. PROVIDE EPOXY COATED, GALVANIZED (ASTM B695, CLASS 50) WASHERS FOR SURFACES THAT CONTAIN ASTM A588 STEELS WHICH ARE EXPOSED TO THE WEATHER OR WHICH ARE EXPOSED TO AMBIENT TEMPERATURES.

    b) TENSION CONTROL FASTENERS SHALL CONFORM TO THE APPLICABLE PROVISIONS OF ASTM A325 TYPE I OR TO ASTM A490 TYPE I. BOLTS, NUTS AND HARDENED WASHERS SHALL BE BY A MANUFACTURER WHICH IS IN POSSESSION OF A CURRENT ICBO APPROVAL AND WHICH HAS BEEN ACCEPTED.

       i) NEITHER A490 TYPE 3 NOR A325 TYPE 2 SHALL BE USED IN THE WORK.

12. DEFORMED ANCHOR BARS SHALL BE ASTM A496 DEFORMED BARS PREPARED FOR STUD WELDING AS MANUFACTURED BY ERICO JONES, OR BY NELSON STUD DIVISION OF TRW, OR OTHER ACCEPTED ANCHOR BAR. PROVIDE 1/2 INCH (12 MM) DIAMETER, 36 INCHES (1000 MM) LONG, UNLESS OTHERWISE GIVEN IN THE DRAWINGS.

13. MILLED SURFACES: COAT WITH BLUE LACQUER 1711 BY VARCROFT PAINT CO., MAGNOFILM BY MAGNUS CHEMICAL CO., OR M-2658 BLUE LACQUER BY U.S. STEEL CORP.

14. DRILLED-IN ANCHORS SHALL BE WEDGE-TYPE. CAPSULE-TYPE SHALL NOT BE PERMITTED. DRILLED-IN ANCHORS DESIGNATED IN THE CONTRACT DRAWINGS AS CARRYING A SPECIFIC TENSILE LOAD SHALL BE TENSILE-TYPE.

    a) WEDGE-TYPE: MOLLY PARABOLT BY MOLLY FASTENER, WEDGE ANCHORS BY ITW RAMSET/RED HEAD, HKB KWIK BOLT BY HILTI, RAWL STUD BY THE RAWL COMPANY, OR OTHER WHERE ACCEPTED.

       i) MATERIAL FOR WEDGE-TYPE ANCHORS SHALL CONFORM TO SAE-J429, GRADE 5 OR TO ASTM A325.

    b) TENSILE-TYPE: MAXI BOLT BY DRILLCO DEVICE, LTD., OR OTHER ACCEPTED ANCHOR.

       i) MATERIAL FOR TENSILE-TYPE SHALL CONFORM TO ASTM A193 WITH NUTS AND WASHERS AS SPECIFIED HEREIN FOR ASTM A325 BOLTS.

    c) GALVANIZING SHALL CONFORM TO ASTM B695, GRADE 50 OR TO ASTM B633.

    d) STAINLESS STEEL FOR STUDS AND WASHERS SHALL CONFORM TO AISI GRADE 304 OR GRADE 316 AND TO ASTM F593, GROUP 1 OR GROUP 2. CONDITION SH FOR WEDGE-TYPE ANCHORS. NUTS SHALL BE OF STAINLESS STEEL CONFORMING TO ASTM F594.

15. ANCHOR BOLTS: MAY BE OF UNCOATED STEEL UNLESS OTHERWISE REQUIRED BY THE CONTRACT DRAWINGS, BY *BUILDING CODE* OR BY GOVERNMENTAL AUTHORITIES HAVING JURISDICTION. UNLESS OTHERWISE PROVIDED IN THE CONTRACT DRAWINGS PROVIDE 3/4 INCH (20 MM) DIAMETER OR LARGER.

    a) UNLESS OTHERWISE GIVEN, PROVIDE AS FOLLOWS:

       i) BOLT MATERIAL CONFORMING TO ASTM A572, GRADE 42.
       ii) TWO HEAVY HEX NUTS AS SPECIFIED FOR ASTM A125.
       iii) 3 X 3 X 3/8 (75X75X10 MM), FY 36 (235 MPA) PLATE WASHER.

    b) WHERE DESIGNATED A325, PROVIDE AS FOLLOWS:

       i) BOLT MATERIAL CONFORMING TO ASTM A125 OR TO ASTM A449.
       ii) TWO HEAVY HEX NUTS AS SPECIFIED FOR ASTM A325.
       iii) 3 X 3 X 1/2 (75X75X12 MM), FY 50 (345 MPA) PLATE WASHER.

16. THREAD LOCKING COMPOUND SHALL BE LOC-TITE 242 OR DRI-LOC 200, AS APPROPRIATE, BY LOC-TITE CORPORATION, PRO-LOCK NUT BY FEL-PRO CORPORATION, OR OTHER ACCEPTED COMPOUND.

17. STEEL DECK SUPPORT SHELVES: PROVIDE ANGLES OF 5/16 INCH (8 MM) MINIMUM THICKNESS AND 3 INCH (75 MM) MINIMUM WIDTH EXCEPT WHERE DIFFERENT SHAPES OR DIMENSIONS ARE ACCEPTED.

18. GRATINGS SHALL BE PROPORTIONED TO RESIST SAFELY THE SUPERIMPOSED LOADS.

    a) FOR PEDESTRIAN LOADING PROVIDE GRIP STRUT, GALVANIZED, PROPORTIONED TO CARRY SAFELY A LIVE LOAD OF NOT LESS THAN 100 PSF (5 KPA).

L. FABRICATION

1. FINISHING SHALL MEAN MILLED TO ASA 250 OR SMOOTHER, UNLESS ANOTHER FINISHING METHOD IS BOTH DESIGNATED IN SHOP DRAWINGS AND ACCEPTED. FINISHED SURFACES SHALL BE PROTECTED BY A CORROSION INHIBITING SUBSTANCE AS PROVIDED HEREIN. FINISH CONTACT SURFACES OF BASE PLATES, COLUMN SPLICES, WHERE INDICATED "FIT TO BEAR", AND AT OTHER LOCATIONS WHERE INDICATED IN THE CONTRACT DRAWINGS.

2. GAS CUTTING: GAS CUTTING, INCLUDING MISCELLANEOUS CUTS, COPES, CUTS FOR WELD ACCESS AND THE LIKE, SHALL PROVIDE SMOOTH, UNIFORM, WORKMANLIKE SURFACES AND SHALL ACHIEVE A 1000 MICRON SURFACE ROUGHNESS OR BETTER AS DEFINED BY ANSI B46.1. EXCEPT WHERE ACCEPTED, GAS CUTTING SHALL BE MACHINE GUIDED; CUTTING BY HAND-GUIDED TOOLS WILL REQUIRE GRINDING. PROVIDE 1/2 INCH (13 MM) MINIMUM RADIUS CUT AT ALL REENTRANT CORNERS EXCEPT WHERE A SMALLER OR LARGER RADIUS FOR SPECIFIC DETAILS IS SHOWN OR NOTED IN THE CONTRACT DRAWINGS OR SPECIFICALLY PROPOSED BY CONTRACTOR AND ACCEPTED IN SHOP DRAWINGS. GAS CUT SURFACES SHALL BE MADE UNIFORM AND NOTCH-FREE BY CHIPPING, PLANING, WELDING AND GRINDING AS REQUIRED, AND SHALL BE VERIFIED BY CONTRACTOR BY FULL VISUAL INSPECTION; WHERE HAND-HELD CUTTING TOOLS ARE USED, AND WHERE REQUIRED BY *AISC SPECIFICATION*, CONTRACTOR SHALL PROVIDE 100% INSPECTION BY DYE-PENETRANT OR BY MAGNETIC PARTICLE.

   a) GALVANIZED MEMBERS: GAS-CUT SURFACES AT RE-ENTRANT CORNERS SHALL BE GROUND TO BRIGHT METAL AND TESTED BY DYE-PENETRANT OR MAGNETIC PARTICLE TESTING PRIOR TO GALVANIZING AND VERIFIED BY CONTRACTOR BY FULL VISUAL INSPECTION AFTER GALVANIZING.

3. STRAIGHTENING: FABRICATED MATERIALS CONTAINING SHARP KINKS OR BENDS SHALL BE REJECTED. MATERIAL STRAIGHTENED PRIOR TO FABRICATION SHALL BE EXAMINED CAREFULLY FOR SIGNS OF DISTRESS AND FOR OTHER DEFECTS BEFORE BEING PLACED IN FABRICATION. DISTRESSED OR OTHERWISE DEFECTIVE MATERIAL SHALL NOT BE USED IN THE WORK. STRAIGHTENING BY THE USE OF PROPERLY CONTROLLED HEAT WILL BE PERMISSIBLE IF DONE BY PERSONNEL SKILLED IN HEAT STRAIGHTENING, USING EQUIPMENT AND TECHNIQUES IN ACCORD WITH WRITTEN PROCEDURE DOCUMENTS AND APPLICABLE DETAIL SKETCHES PREPARED BY THE FABRICATOR AND ACCEPTED BY ENGINEER.

4. GRINDING: SHARP CORNERS, PROJECTIONS, AND SIMILAR ROUGH OR SHARP SURFACES OR EDGES SHALL BE EASED AND SMOOTHED BY GRINDING SO AS TO PROVIDE NOTCH-FREE SURFACES.

5. PREHEAT: WELDING SHALL BE PERFORMED ON MATERIAL PREHEATED TO A TEMPERATURE ABOVE THE DEWPOINT, REGARDLESS OF OTHER PREHEATING REQUIREMENTS. PREHEAT FOR WELDING SHALL BE SOAKED PREHEAT AND SHALL BE VERIFIED BY HEAT SENSITIVE CRAYONS (TEMPILSTIK) OR OTHER ACCEPTED MEANS.

6. WELDING MATERIALS AND PROCESSES SHALL BE SELECTED FROM THOSE NOTED HEREIN AND SHALL CONFORM TO ACCEPTED WELDING PROCEDURE SPECIFICATIONS. WELDING MATERIALS SHALL BE FRESH AND NEW. WELDING ELECTRODES OR FLUX CONTAMINATED BY DELETERIDOS SUBSTANCES OR MOISTURE SHALL NOT BE USED AND SHALL BE REMOVED PROMPTLY FROM THE WORK. LOW HYDROGEN ELECTRODES WHICH CANNOT BE USED PROMPTLY AFTER OPENING OF HERMETICALLY SEALED CONTAINERS SHALL BE STORED IN ELECTRIC HOLDING OVENS AT 250°F (120°C) MINIMUM. ELECTRODES OR FLUX WHICH HAVE BEEN DAMPENED OR CONTAMINATED SHALL BE REMOVED PROMPTLY FROM THE WORK.

7. TACK WELDS: EXERCISE THE SAME DEGREE OF CONTROL IN MAKING TACK WELDS AS REQUIRED FOR STRUCTURAL WELDS, INCLUDING PROVISION OF PREHEAT AND POSTHEAT APPROPRIATE TO THE BASEMETALS JOINED. TACK WELDS WHICH CRACK SHALL BE CUT OR GROUND AND DAMAGED BASE METAL REPAIRED. REMOVE AND GRIND SMOOTH TACK WELDS NOT INCORPORATED INTO PERMANENT STRUCTURAL WELDS.

8. ARC STRIKES: STRAY ARCING BETWEEN ELECTRODES OR OTHER PORTIONS OF THE WELDING SYSTEM AND BASE METAL LOCATIONS OUTSIDE STRUCTURAL WELDS SHALL BE AVOIDED TO THE MAXIMUM EXTENT PRACTICABLE. IN THOSE LOCATIONS WHERE ARC STRIKES DO OCCUR, THE AFFECTED BASE METAL SHALL BE GROUND SMOOTH, OR OTHERWISE REPAIRED, TO REMOVE THE EFFECTS OF THE ARC STRIKE AND ENSURE CONTINUING SOUNDNESS OF THE BASE METAL.

9. SHOP BOLTING WITH ASTM A325 OR ASTM A490 BOLTS SHALL CONFORM TO APPLICABLE PROVISIONS OF THE *AISC SPECIFICATION* AND *SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS* EXCEPT THAT ALL BOLTING PROVISIONS SET FORTH HEREIN SHALL APPLY TO HIGH-STRENGTH SHOP BOLTING.

10. DRAINAGE HOLES: PROVIDE HOLLOW TUBULAR, BOX AND OTHER MEMBERS WITH EFFECTIVE DRAINAGE HOLES EXCEPT WHERE MEMBERS ARE SEALED TIGHT AT CONTRACTOR'S OPTION OR IN ACCORD WITH NOTES AND DETAILS INCLUDED IN THE CONTRACT DRAWINGS. CONTRACTOR IS FULLY RESPONSIBLE TO PROVIDE STEELWORK FREE OF ENTRAPPED WATER AT THE COMPLETION OF THE CONTRACT.

    WHERE ONE END OF A GALVANIZED TUBE IS SPECIFIED TO BE SEALED, PROVIDE A 13/16 INCH DIAMETER HOLE AT THE OPPOSITE END TO PERMIT PRESSURE RELIEF DURING THE HOT DIP PROCESS. WHERE BOTH ENDS ARE SEALED, WELD ONE END PLATE ON THE TUBE AFTER THE GALVANIZING PROCESS.

11. BEAM OPENINGS: PROVI
    SCHEDULED IN THE CONT
    SLOTS AND OPENINGS RE
    TRADES TOGETHER WITH
    SUITABLE TEMPLATES FO
    WHERE OPENINGS ARE SH
    SHOP DRAWINGS, CHANGE
    EXCEPT WHERE ACCEPTED
    SHOWN OR SCHEDULED SH
    SPECIFICALLY.

12. BOLT HOLES: DRILL OR
    SURFACE OF THE METAL.
    1/16 INCH (1500 μM) L
    UNLESS OVERSIZE OR SL
    THE CONTRACT DRAWINGS
    MAKE OR ENLARGE HOLES
    AND REAM MATERIAL WHE
    DIAMETER AND IN ALL M
    MM). HOLES SHALL BE
    RAGGED EDGES. ELONGA
    USED TO PUNCH ELONGAT
    WITH A TOOL PROVIDING

13. QUALITY OF WELDS AND
    SHALL CONFORM TO AWS
    BY UT, PARTIAL AND CO
    CONFORM TO AWS D1.1,
    PENETRATION SHALL BE
    POSSESSING SUCH DEFEC
    OR REJECTION CRITERIA
    DISCONTINUITIES BEFOR
    TEARING AFTER WELDING
    PROCEDURES ACCEPTED B
    AND REPLACED.

    a) PROVIDE MATERIAL
       ACCORD WITH DETA
       SHOWN, AND IN AC
       D1.1, ARTICLE 9.

    b) PROVIDE WELD ACC
       DETAILS SHOWN IN
       PROVISIONS OF AW
       SPECIFICATION AN
       CONTAINED HEREIN
       FREE WELD METAL

14. BRITTLE FRACTURE: CON
    NECESSARY TO MINIMIZE
    FRACTURE. MEASURES S
    SELECTION, FABRICATIO

    a) BOTH BASE METAL
       ADEQUAT: "TCH T

    b) STRESS CONCENTRA
       CAREFULLY CONTRO
       WELD DEFECTS SUC
       CRACKING. STRES
       ALL WELDED WEB-T
       FLANGE THICKNESS

    c) WELDS, INCLUDING
       COMPLETED IN A S
       INTERRUPTION.

    d) COOLING RATES AN
       WELDS SHALL BE R
       BLANKETS AND, WH

    e) EXCESSIVE ELEVAT
       BE AVOIDED. PRA
       WELDING OF BOTH
       BOSOM OF A WIDE

    f) PROVIDE AND THEN
       ALL LOCATIONS WH
       OF WELD MAY CREA

    g) PARTICULAR CARE
       CRACKING.

       i) PRE-HEAT AN
          PROVIDED NO
          3.2-1. IN
          EQUIVALENT
          IIN MERCURY

          CE = C+MN/6

       ii) THE VALUES
           ELECTRODES
           THOROUGHLY
           WELDING GRO
           SUFFICIENT
           RATE AND WI
           ORDER TO KE
           MINIMUM VAL
           SECTIONS AR

       iii) WELD COOLIN
            REDUCE RESI
            TO ENHANCE

       iv) WELDING AT AN
           (0°C) SHALL N
           ACCEPTANCE.

    h) TAKE SPECIAL CARE
       OTHER CUTS SO AS
       REDUCE THE POTENT

TABLE

PREHEAT AND POSTHEAT CONDI

CE (IIW)	FLANGE < 1-1/2 IN (38 MM)	≥ 1-1/2 IN (38 MM)
≤ 0.38	–	
≤ 0.40	PREHEAT ≥ 125°F INTERPASS ≥ 125°F	
≤ 0.42		
≤ 0.44		PROVIDE I… 350°F AND…
≤ 0.46		
≥ 0.46		

NOTE: 125°F = 52°C, 350°F

15. WELD INSPECTION: CONT
    FIELD INSPECTION TO ASS
    THE REQUIREMENTS OF CON
    SPECIFICATIONS. GOVERN
    NOT LIMITED TO CONTRACT
    ANSI/AWS D1.1. ALL INS
    ARE IN TENSION, WITH DI
    CRITICAL DIRECTION (FOR
    UNDERCUT).

16. RUNON AND RUNOFF TABS S
    MADE SMOOTH PRIOR TO VI
    AND PRIOR TO SHIPPING S
    TABS FOR FIELD WELDS SH
    WHERE REQUIRED OR DIREC

17. CLEAN, PAINT AND GALVAN
    DO NOT PAINT STEEL EXCE
    HEREIN OR IN THE CONTRA